AMERICAN ANNALS OF THE DEAF

Official Organ

Conference of Executives of American Schools for the Deaf
Convention of American Instructors of the Deaf

LEONARD M. ELSTAD
Editor

POWRIE V. DOCTOR
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Under the direction of

CLARENCE J. SETTLES, Florida, 1945

ELWOOD A. STEVENSON, California, 1945

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MRS. H. T. POORE, Tennessee, 1948

IGNATIUS BJORLEE, Maryland, 1951

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PERCIVAL HALL, District of Columbia, *ex officio*

Executive Committee of the Conference

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The Convention of American Instructors of the Deaf, founded in 1850 and incorporated by act of Congress in 1897, is an organization of educators of the deaf in the United States and Canada with the general object of "promotion of the education of the deaf on the broadest, most advanced, and practical lines," and for that purpose "to secure the harmonious union, in one organization, of all persons actually engaged in educating the deaf in America."

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AMERICAN ANNALS OF THE DEAF

Vol. 91 MAY, 1946 No. 3

Sounds Changed Into Visual Pattern By New Device in Bell Laboratory

BELL TELEPHONE LABORATORIES recently announced an instrument which translated sound into a visual pattern. While other instruments have been made before which translate sound waves into a visual design, these designs could not be easily identified because there are sounds which are indistinguishable to the ear but nevertheless have different waves. The problem, then, which faced Bell Telephone Laboratories was to translate sound into a form that the eye can see at a glance. The Laboratories have made such an instrument. The visible speech device can show the three dimensions of sound—frequency, time, and intensity—on a screen to be read by the eye. Time is translated in terms of the width of the picture. A short sound has a narrow picture and a long drawn out sound has a wide picture. Frequency is spread out from top to the bottom of the screen. A high frequency covers the screen from the top to the bottom while a low frequency just goes up a short way from the bottom. The intensity of the sound is shown by the different shades of gray in the visual design.

This display of sound provides for the eye an opportunity to analyze sound so that the different aspects of it can be studied. Thus the eye can substitute for the ear. A deaf person can then read the sound and so improve his speech and even understand what is being said. These possibilities are no mere guesses or armchair conjectures.

Already a deaf man has learned to read visible speech.

Edgar Bloom, deaf since infancy, recently took part in a demonstration of the instrument. Mr. Bloom, an engineer at the Laboratories, was able to improve his speech by making use of the instrument. Miss Harriet Green, in charge of experimental training on the visible speech instrument, sat behind Mr. Bloom while he faced the screen of the instrument. Mr. Bloom could not lip read Miss Green under these circumstances. She spoke into a microphone and Mr. Bloom, who held another, kept his eyes on the screen. Pictures of the words spoken by Miss Green appeared on it. As she talked various patterns appeared on the screen in certain ways almost the same as the news bulletins flash across the ribbon of lights on the sides of the Times Building in New York City. By watching these pictures, Mr. Bloom was able to repeat with remarkable accuracy the words uttered by Miss Green. When he made a slight mistake in pronunciation, the two pictures were different. Immediately he literally saw his mistaken pronunciation and was able to correct it. For instance Miss Green said "Out" into the microphone and the image on the screen appeared similar to a boat in front of a tree trunk. When Mr. Bloom said it, it sounded like "Owwt." And it appeared like a fat ferry boat in front of a tree trunk. With a little correction he reduced the ferry and so said "Out."

Mr. Bloom did not arrive at this stage of skill in use of the instrument without a long training period. He spent nearly a year in training.

Since a person can learn to recognize different pronunciations of words on the screen, it is but a small step to learn to follow a conversation. Such a step has already been taken. A few young women have conversed over the telephone using visible speech. The time may be coming closer when the deaf and the severely hard of hearing may be able to use the telephone, the radio, and even to follow a conversation in the living room of their homes. The visible speech instrument will act as a translator of the spoken word into a picture to be read by the eye. Thus the objective of the early researches of Alexander Graham Bell, inventor of the telephone, is achieved by the Laboratory which is an outgrowth of his work.

The visible speech instrument will have other uses. Words may be printed phonetically and our antiquated alphabet may die from lack of use. Printed symbols may be retranslated into sound and thus the blind may be able to read the same books and other printed matter that sighted (who have learned visible speech) use. Machines may be controlled by such a device. Further developments are possible using colors, contours, and other techniques.

At present there are two instruments in use. A "spectograph" takes pictures of the sound which can be studied at one's leisure while the "translator" shows sound on a moving screen. Both instruments will have uses in the education of the deaf.

Dr. O. E. Buckley, president of the Bell Telephone Laboratories, says that while the instruments are not ready for the market it is hoped that some experimental equipment can be provided educators who can conduct training programs with them. The further development of this instrument along practical lines may be the answer to the tendency to place hearing aids on all deaf children regardless of their needs and possibilities to profit. It will also take a great deal of the guessing out of lip-read conversations because visible speech is a more exact representation of sound than lip and face movements.

—*The Michigan Mirror*, March, 1946

The preceding article very clearly pictures the results already obtained with the use of the greatly publicized Visible Speech equipment developed by the Bell Laboratory. It is interesting to note that there is work being done at present which will add pitch to the three dimensions of frequency, time and intensity. This, of course, can be of tremendous help in the education of the deaf child, because pitch changes are the most difficult to teach.

There is much research work yet to be done, and the natural place for this would be in some research center located in or near a school for the deaf. It seems that the primary concern of the Bell Laboratory is with the deaf problem. They are very much interested in a thorough evaluation of Visible Speech in this field. There must, of

necessity, be experimental work done with children who are just beginning to learn speech. Also, much experimental work can be done with children who have faulty speech patterns. In the proper school program these children could take daily work with this equipment. It is fortunate that it will be possible to see demonstrations of the use of this equipment at the Conference of the American Association to Promote the Teaching of Speech to the Deaf, which is to be held in New York City in June.

—L. M. E.

A Study of the Usefulness of Objective Measures of Mechanical Aptitude in Guidance Programs for the Hypacousic—II*

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RANK ORDER CORRELATIONS BETWEEN TEST SCORES AND RATINGS BY SHOP INSTRUCTORS

THE MOST difficult problem involved in determining the usefulness of objective measures is that of obtaining adequate criteria with which the test results can be compared. The usual procedure in evaluating objective measures is to accept an established and tried test as valid, and appraise the new test on the basis of the degree to which it correlates with the established measure. For the purposes of this investigation this procedure was not considered the most effectual because the measures being evaluated were standardized on hearing subjects. The method adopted was to correlate the test scores with ratings of the subjects made by shop instructors. It is pertinent to recall, however, that one of the reasons Binet gave for devising his test was that teachers could not estimate the true intellectual level of their pupils. Some years later Terman, who revised the Binet Scale, gave as proof of the excellence of his revision that it correlated highly with school progress. Even though it might seem regrettable, empirical judgment ultimately is the deciding factor, because all evidence objective or otherwise is more cumulative than decisive.

The question arises, if correlation with teachers' estimates is used as being indicative of the validity of the tests, why do we not accept these estimates rather than attempt to use objective measures? First, the teachers must know the subjects for a considerable length of time before being able

Part I of this article was published in the ANNALS for March, 1946, (Vol. 91, No. 2), pp. 123–150.

to make an estimate. Furthermore, individuals vary with respect to their ability to make estimates. Specifically, the desirability of determining the usefulness of objective measures of mechanical ability for use with the hypacousic, is that the present try-out method which is used in schools for the deaf requires from four to six years to determine the existence of certain degrees of mechanical aptitude. Ultimately this determination, with respect to any given subject, might be quite accurate. However, the value of this finding lies in its being known at the time of the subject's entrance into the vocational department rather than from four to six years later.

Considering shop grades to be one form of teachers' estimates, an attempt was first made to correlate the test scores with the subject's grades in vocational courses. Because of the narrow range of the grades this proved ineffectual. The results from the scatter diagrams revealed that in grading, the teachers were scaling toward the mean, or average. If a subject excelled and did "A" work, he was not graded "A" but probably "B." If a subject was doing inferior work, he was not graded "F" but probably "D." Therefore, the remaining grade range was from "B" to "D," whereas the range of the test scores was from very superior to very inferior. As a result the correlations between test scores and shop grades were spuriously high or low. To overcome this problem the teachers were asked to rate the subjects in order from highest to lowest in mechanical ability. Explanations and instructions were given the teachers relative to the common errors in rating. They were asked to disregard personality factors as much as possible and rate only in terms of whether they considered a specific subject superior or inferior to the other subjects with respect to mechanical ability. In no case had a teacher known the pupil to be rated for less than one year, and in most instances the pupil had been known for four years or more. The five vocational courses in which ratings were secured are: printing, linotyping, metal work, photo-engraving and woodwork. The correlations between the test scores and ratings in the various vocational shops are presented in Table X. These cor-

relations were computed by Spearman's rank-difference method.[27] After computing the Spearman rho coefficient it was converted into its equivalent Pearson r according to the table by Guilford.[28] A commonly accepted test of significance for a correlation coefficient is to determine whether it is three times its standard error. Perhaps a better method of interpretation, as Guilford suggests,[29] is to find how large the correlation should be for varying numbers of cases and for different levels of significance. This is the method of interpretation which was employed.

TABLE X

Rank Order Correlations* between Tests of Mechanical Ability and Shop Work

Shop	Tests					
	Stenquist	Paper Form Board	Spatial Relations		Mechanical Assembly	
			Time	Errors	Set I	Set II
Printing	.60±.10	.56±.10	.18±.15	.16±.11	.42±.12	.23±.15
Linotyping	.09±.27	.78±.12	.00±.02	.27±.27	.11±.29	.05±.02
Metal Work	.56±.14	.33±.19	.43±.17	.17±.20	.56±.14	.52±.15
Photo-Engraving	.51±.20	.27±.25	.42±.22	.31±.25	.32±.24	.25±.25
Woodwork	.50±.16	.34±.19	.50±.16	.13±.21	.39±.18	.41±.17

* Corrected to Pearson r according to Guilford, *Fundamental Statistics in Psychology and Education*, p. 229.

Correlations between Stenquist Test Scores and Ratings in Shop Work. From Table X we find that the correlation is .60±.10 between the Stenquist scores and ratings for printing. According to the test for significance, a correlation of .288 is required to be significant and one of .372 to be very significant.[30] The obtained correlation is decidedly above the latter and is considered highly significant. The standard error is .10, which indicates that the correlation is fairly reliable. The correlation between the Stenquist scores and ratings in linotyping is .09±.27. This correlation is markedly below that which is required to be significant and it is considered as indicating no relationship between the variables. The cor-

[27] Guilford, *Fundamental Statistics in Psychology and Education*, p. 227
[28] *Ibid.*, p. 229
[29] *Ibid.*, p. 211
[30] *Ibid.*, Table D, p. 323

relation between the Stenquist scores and ratings in metal work is .56±.14. According to the test for significance this correlation must be .396 to be significant and .505 to be very significant. The obtained correlation will vary from .42 to .70, two times out of three. The relationship between the Stenquist scores and ratings in metal work is interpreted as being reliable; the statistical probabilities are that in many instances it will be very significant. The correlation between the Stenquist scores and ratings in photo-engraving is .51±.20. This correlation to be significant must be .497, and to be very significant it must be .623. The obtained correlation indicates a significant relationship. However, it must be interpreted cautiously because of the large standard error. Although the standard error indicates low reliability, the statistical probabilities of no significant relationship existing are remote, inasmuch as two times out of three the obtained correlation will vary from .31 to .71. The correlation between the Stenquist scores and ratings in woodwork is .50±.16. This correlation must be .396 to be significant and .505 to be very significant. The obtained correlation just fulfills the requirements for being very significant. The standard error indicates fairly low reliability, but because the correlation is high, at the one percent level, the relationship is considered reliable. Again, the statistical probabilities of no significant relationship existing are remote.

From the above correlations we find that the Stenquist Test scores correlate significantly, and in some instances very significantly, with ratings in printing, metal work, photo-engraving and woodwork. No relationship was found between these scores and ratings in linotyping. These results indicate that the Stenquist Test is sufficiently valid to be useful in guidance of the hypacousic.

Correlations between Scores on the Minnesota Paper Form Board and Ratings in Shop Work. From Table X we find that the correlation is .56±.10 between the Paper Form Board scores and ratings in printing. This correlation is markedly above .372 which is required to be very significant. The standard error of .10 indicates that the correlation is fairly reliable. Two times out of three the obtained correla-

tion will vary from .46 to .66. In no instance will this variation cause the correlation to fall below the level of being very significant. The correlation is .78±.12 between scores on the Paper Form Board and ratings in linotyping. A correlation of .684 is required to be very significant. The obtained correlation is higher than required and the standard error of .12 indicates a high degree of reliability. Two out of three times this correlation will vary from .66 to .90. This is interpreted as highly significant and reliable. The correlation is .33±.19 between scores on the Paper Form Board and ratings in metal work, the correlation is .27±.25 between these scores and ratings in photo-engraving, and the correlation is .34±.19 between these scores and ratings in woodwork. These correlations are below the required level of statistical significance. They are interpreted as indicating a slight but unreliable correlation.

Scores on the Minnesota Paper Form Board correlate very significantly with ratings in printing and linotyping. These results indicate that the Paper Form Board would be useful in predicting vocational success in these shops. No significant relationship was found between the scores on the Paper Form Board and ratings in metal work, photo-engraving, and woodwork.

Correlations between Time Scores on the Minnesota Spatial Relations Test and Ratings in Shop Work. The correlation is .18±.15 between time scores on the Spatial Relations Test and ratings in printing, and the correlation is .00±.02 between these scores and ratings in linotyping. These correlations are considerably below the statistical requirements for reliability and are interpreted as indicating no relationship between the variables. The correlation is .43±.17 between the Spatial Relations time scores and ratings in metal work. This correlation to be significant must be .396, and to be very significant must be .505. The obtained correlation is significant but fails to meet the requirements for being very significant. The standard error of .17 indicates rather low reliability. However, because two times out of three this correlation will vary from .26 to .60 it is interpreted as being significant. The correlation is .42±.22 between the Spatial

Relations time scores and ratings in photo-engraving. The test for significance reveals that this correlation must be .497 to be significant. The obtained correlation of .42 is slightly below this requirement. It is interpreted as indicating a relationship, but because it fails to meet the requirements for significance it is unreliable for the purposes of prediction. The correlation between the time scores on the Spatial Relations Test and ratings in woodwork is $.50 \pm .16$. This correlation to be significant must be .396, and .505 to be very significant. The obtained correlation of .50 fulfills the requirements for being very significant, but because of the standard error of .16 must be interpreted cautiously. However, two times out of three this correlation will vary from .34 to .66. According to the test for significance, irrespective of this variation, the statistical probabilities of no significant relationship existing are remote.

The time scores on the Minnesota Spatial Relations test and ratings in metal work correlate significantly, and the time scores and ratings in woodwork correlate very significantly. No significant relationship was found to exist between the time scores and ratings in printing, linotyping, and photo-engraving. The correlations between the time scores and ratings in metal work and woodwork indicate that this test would be useful in predicting vocational success in these shops.

Correlations between Error Scores on the Minnesota Spatial Relations Test and Ratings in Shop Work. The correlations between the error scores and the ratings in the various shops are: printing, $-.16 \pm .11$; linotyping, $-.27 \pm .27$; metal work, $.17 \pm .20$; photo-engraving, $.31 \pm .25$; woodwork, $.13 \pm .21$. In no instance is there a significant correlation between the error scores and the ratings in shop work. The standard errors of these correlations are large and indicate low reliability. The relationship between the error scores and ratings in shop work is interpreted as being insignificant and unreliable for prediction with respect to success in these vocational shops. Previous analysis of the error scores suggested that these results reveal a difference between hypacousic and normally hearing boys relative to their mental

processes, and to their generalized approach to the problems presented by the Spatial Relations Test. The negative correlations between the error scores and ratings in printing and linotyping seem pertinent in this respect. These correlations indicate that the boys who make the most errors on this test eventually make the best printers and linotyping where the correlation between the error score and ratings is $-.27$. Because this correlation is above .20 it might be interpreted as indicating slightly significant relationship in terms of groups, but obviously not significant for predictive purposes. According to these results a boy should not be too cautious relative to his trial and error processes in solving the problems of this test if he is to become a successful printer or linotypist. The suggestion seems to be that the greater the cautiousness, the less speed will be acquired in type setting or in operating a linotype machine. These observations are tentative and suggestive in nature. Definite conclusions must await further investigation in this area.

Correlations between Scores on Set I of the Minnesota Mechanical Assembly and Ratings in Shop Work. The correlation is $.42 \pm .12$ between scores on Set I of the Assembly Test and ratings in printing. To be significant this correlation must be .288, and .372 to be very significant. The obtained correlation meets the requirements for being very significant. The standard error of .12 indicates fairly high reliability. Two times out of three this correlation will vary from .30 to .54. In no instance would this variation cause the correlation to fall below the requirements for significance. The relationship between the scores on Set I of the assembly and ratings in printing is interpreted as being significant and reliable. The correlation is $.11 \pm .29$ between these scores and ratings in linotyping. This correlation falls far below the requirements for statistical significance, and is interpreted as revealing no relationship between the variables. The correlation is $.56 \pm .14$ between the scores of Set I on the Assembly and ratings in metal work. This correlation to be significant must be .396, and .505 to be very significant. The obtained correlation is above the requirements for being very significant. The standard error of .14 reveals that two times out of

three this correlation will vary from .42 and .70. In no instance would this variation fall below the statistical level of significance. The relationship indicated by these results is interpreted as being significant and reliable. The correlation is .32±.24 between the scores on Set I of the Assembly Test and ratings in photo-engraving. This correlation falls below the level of statistical significance and is interpreted as indicating a slight but unreliable relationship between the variables. The correlation is .39±.18 between the scores on Set I and ratings in woodwork. To be significant this correlation must be .396. The obtained correlation indicates that the relationship is significant but that it can not be interpreted as being conclusively reliable.

The correlations are significant between the scores on Set I of the Minnesota Assembly Test and ratings in printing, metal work and woodwork. No significant relationship was found between these scores and ratings in linotyping and photo-engraving. These results indicate that Set I of the Assembly Test would be useful in guidance of the hypacousic.

Correlations between Scores on Set II of the Minnesota Assembly Test and Ratings in Shop Work. The correlation is .23±.15 between scores on Set II of the Assembly tests and ratings in printing, and the correlation is −.05±.02 between these scores and ratings in linotyping. These correlations fall below the levels of statistical significance and are interpreted as indicating no relationship between the variables. The correlation is .52±.15 between the scores on Set II and ratings in metal work. This correlation to be significant must be .396, and .505 to be very significant. The obtained correlation falls within the level of being very significant. The standard error of .15 reveals that this correlation, two times out of three, will vary from .37 to .67. This variation indicates that the relationship can not be considered entirely reliable, but that the statistical probabilities of no significant relationship are remote. The correlation is .25±.25 between scores on Set II and ratings in photo-engraving. This correlation falls below the level of statistical significance and is interpreted as indicating no

relationship between the variables. The correlation is .41±.17 between scores on Set II and ratings in woodwork. This correlation to be significant must be .396, and .505 to be very significant. The obtained correlation is significant but not very significant. The standard error of .17 indicates rather low reliability. The relationship between scores on Set II and ratings in woodwork is interpreted as being significant but somewhat unreliable.

The scores on Set II of the Minnesota Assembly Test correlate significantly with ratings in metal work and woodwork; the correlation with woodwork is somewhat unreliable No relationship was found between these scores and ratings in printing, linotyping, and photo-engraving. Comparing the correlation results of Set I and Set II, with the exception of the correlation between Set II and ratings in woodwork, the results from Set II correlate less significantly and less reliably than the results from Set I with ratings in shop work. This corroborates the suggestion of a possible practice effect on Set II, and indicates that these results are less valid than the Set I results. However, the significant correlations between scores on Set II and ratings in metal work and woodwork indicate that this Set would be useful in guidance of hypacousic boys.

Tests Correlating Significantly with Ratings in Each of the Vocational Shops. Table XI summarizes the findings of the correlations between test scores and shop work ratings. The "checks" in the table signify significant correlation with the corresponding shop. Although the correlation between the scores on any given test might correlate very significantly and reliably with ratings in any given shop, a guidance counselor would be reluctant to predict on the basis of only one test. If the scores from two or three tests correlate significantly with ratings in a given shop, and if a subject scores above average on all of these tests, a counselor might predict with considerable assurance, disregarding motivation and interest. On the basis of the correlations with shop work ratings, the Stenquist, Paper Form Board, and Set I of the Mechanical Assembly Test might be considered useful in the prediction of success in the printing shop. Only the

Paper Form Board Test is useful in prediction of success in the linotyping shop. The Stenquist, the time score on the Spatial Relations Test, and Sets I and II of the Mechanical Assembly might be considered useful in predicting success in the metal shop. Only the Stenquist is useful for the purposes of predicting success in the photo-engraving shop. The Stenquist, the time score on the Spatial Relations Test and Sets I and II of the Mechanical Assembly Test might be

TABLE XI

Tests Correlating Significantly* with Ratings in Each of the Vocational Shops

Shop	Tests					
	Sten-quist	Paper Form Board	Spatial Relations		Mech. Assembly	
			Time	Errors	Set I	Set II
Printing	×	×			×	
Linotyping		×				
Metal Work	×		×		×	×
Photo-Engraving	×					
Woodwork	×		×		×	×

* The "×" indicates significant correlation.

considered useful in predicting success in the woodworking shop. With the exception of the error scores, all the test results correlate significantly with ratings in at least two shops. On this basis all of the tests might be considered useful in guidance of hypacousic boys.

Comparison of Test Scores with Shop Instructors', and Foremen's Ratings

Because of the difficulty of securing other criteria, the evaluation of the usefulness of objective measures of mechanical ability must be based largely on the effectiveness with which these measures predict success in vocational courses. However, an indication of the extent to which these test results suggest success in an actual work situation is desirable. An attempt was made in this investigation to de-

termine the consistency between the test scores, the shop instructor's ratings and ratings by the shop foreman. Because a small number of the subjects included in this study are employed, only twelve ratings by foremen could be secured. However, irrespective of the small number of cases, these results seemed sufficiently revealing to warrant inclusion in the final evaluation.

A rating scale together with a letter of explanation was sent to the various foremen. A copy of the rating scale prepared for this purpose is presented below.

NAME _____

TYPE OF WORK HE IS DOING FOR YOU _____

_____

Please check:

DOES HE HAVE

1. EXCELLENT ABILITY _____
2. ABOVE AVERAGE ABILITY _____
3. AVERAGE ABILITY _____
4. BELOW AVERAGE ABILITY _____
5. POOR ABILITY _____

DOES HE GET ALONG WELL WITH HIS CO-WORKERS?

YES_____ NO_____

REMARKS

Make any comments you care to concerning this person's work.

YOUR POSITION _____

The test rating was obtained by averaging the scores on all of the tests. Because the error scores on the Minnesota Spatial Relations Test do not correlate significantly with the other measures and with the shop ratings, these scores were not included in the average of the subject's test results. The instructor's rating represents the subject's rank in the shop in which he concentrated.

Case 1. Case One is a boy twenty years of age who has no usable residual hearing. He became deaf from meningitis at nine months of age. He concentrated his vocational training in the metal shop and is now employed as a machinist. The ratings for Case One are presented in Table XII. His ratings

on the tests and by the foreman are in agreement; both rated him above average. The instructor rated him as excellent. The foreman reports that this boy gets along well with his co-workers but that he is somewhat lacking in initiative.

TABLE XII

Comparison of Test Scores with Ratings by Shop Instructor and Foreman for Case 1

Degree of Ability	Test Rating	Foreman's Rating	Instructor's Rating
Excellent			×
Above Average	×	×	
Average			
Below Average			
Poor			

Case 2. Case Two is eighteen years of age. He has been deaf since infancy and has no usable residual hearing. He concentrated his vocational training in the photo-engraving shop and is now employed as a router's helper. The foreman reports that he gets along fairly well with his co-workers but that he needs supervision most of the time. The ratings for Case Two are presented in Table XIII. His ratings on the tests and by the foreman are identical; both rated him as possessing average mechanical ability. The instructor rated him as being above average.

TABLE XIII

Comparison of Test Scores with Ratings by Shop Instructor and Foreman for Case 2

Degree of Ability	Test Rating	Foreman's Rating	Instructor's Rating
Excellent			
Above Average			×
Average	×	×	
Below Average			
Poor			

Case 3. Case Three is nineteen years of age. Having completed his academic training at the Newark Day School, he entered the New Jersey School for the Deaf for vocational training. He concentrated in the printing shop but did not

complete his training. He is employed as a factory worker but the exact nature of his work was not reported. The ratings for Case Three are presented in Table XIV. His ratings on the tests and by the foreman are identical; both

TABLE XIV

Comparison of Test Scores with Ratings by Shop Instructor and Foreman for Case 3

Degree of Ability	Test Rating	Foreman's Rating	Instructor's Rating
Excellent			
Above Average			
Average	×	×	
Below Average			×
Poor			

rated him as being average with respect to mechanical ability. The instructor rated him as being below average.

Case 4. This boy became deaf from typhoid fever at five years of age. He is now twenty years of age. He concentrated his vocational training in woodworking and is now employed in a cabinet making shop. The foreman reports that he does not get along well with his co-workers and that they question his loyalty as an employee. The ratings for Case Four are presented in Table XV. The ratings on the tests and by the foreman are identical; both rated him as being of average

TABLE XV

Comparison of Test Scores with Ratings by Shop Instructor and Foreman for Case 4

Degree of Ability	Test Rating	Foreman's Rating	Instructor's Rating
Excellent			×
Above Average			
Average	×	×	
Below Average			
Poor			

ability. The instructor rated him as having excellent ability.

Case 5. Case Five is nineteen years of age and has been deaf from infancy. He concentrated his training in the linotyping shop and is now employed as an operator of an inter-

type machine. The foreman reports that he gets along well with his co-workers and that he is very conscientious and happy. The ratings for case five are presented in Table XVI. The ratings by the foreman and instructor are identical; both rated him as being excellent with respect to mechanical ability. He rated below average on the tests.

Case 6. This boy is eighteen years of age. He became deaf from meningitis at six years. He has no usable residual hearing. He concentrated his training in the upholstery shop and is now employed in a large furniture factory. The fore-

TABLE XVI

Comparison of Test Scores with Ratings by Shop Instructor and Foreman for Case 5

Degree of Ability	Test Rating	Foreman's Rating	Instructor's Rating
Excellent		×	×
Above Average			
Average			
Below Average	×		
Poor			

man reports that he gets along well with his co-workers and that he is well liked. The ratings for Case Six are presented in Table XVII. The ratings on the tests and by the foreman

TABLE XVII

Comparison of Test Scores with Ratings by Shop Instructor and Foreman for Case 6

Degree of Ability	Test Rating	Foreman's Rating	Instructor's Rating
Excellent			×
Above Average	×	×	
Average			
Below Average			
Poor			

are identical; both rated him as being above average in ability. The instructor rated him as being of excellent ability.

Case 7. This boy became deaf from meningitis in infancy. He is now eighteen years of age. He has no usable residual hearing. He concentrated his training in the woodworking shop, and for a short time was employed as a "shop joiner's

helper." The foreman reports that he did not get along well with his co-workers and that he was unable to grasp the general idea of the work involved. The ratings for Case Seven are presented in Table XVIII. The three ratings are identical, all classifying this boy as being poor relative to mechanical ability.

Case 8. The etiology in Case Eight is somewhat obscure. It is presumed that he has been deaf from birth. The socio-economic status of the family is above average; the father

TABLE XVIII

Comparison of Test Scores with Ratings by Shop Instructor and Foreman for Case 7

Degree of Ability	Test Rating	Foreman's Rating	Instructor's Rating
Excellent			
Above Average			
Average			
Below Average			
Poor	×	×	×

is a physician. This boy concentrated his training in the linotyping shop and he is now employed on the staff of a newspaper. He takes proofs, assists in make-up and operates a linotype machine. The foreman reports that he gets along

TABLE XIX

Comparison of Test Scores with Ratings by Shop Instructor and Foreman for Case 8

Degree of Ability	Test Rating	Foreman's Rating	Instructor's Rating
Excellent			
Above Average			
Average	×	×	
Below Average			×
Poor			

well with his co-workers, but that the quality of his work is inconsistent. The ratings for Case Eight are presented in Table XIX. The ratings on the tests and by the foreman are identical; both rated him as being of average mechanical

ability. The instructor rated him as being of below average ability.

Case 9. This boy is twenty-one years of age. He has been becoming progressively deaf since childhood. He has suffi-

TABLE XX

Comparison of Test Scores with Ratings by Shop Instructor and Foreman for Case 9

Degree of Ability	Test Rating	Foreman's Rating	Instructors's Rating
Excellent			
Above Average		×	×
Average	×		
Below Average			
Poor			

cient residual hearing to be helpful to him. He concentrated his training in the linotyping shop and is now employed as a linotype operator. The foreman reports that he gets along well with his co-workers. The ratings for Case Nine are

TABLE XXI

Comparison of Test Scores with Ratings by Shop Instructor and Foreman for Case 10

Degree of Ability	Test Rating	Foreman's Rating	Instructor's Rating
Excellent			
Above Average			
Average	×	×	×
Below Average			
Poor			

presented in Table XX. He rated as being of average ability on the tests. Both the foreman and the instructor rated him as being of above average ability.

Case 10. Case Ten is eighteen years of age. He has been deaf since two years of age, at which time he had double mastoiditis. He has some usable residual hearing. He concentrated his training in the metal shop and is now employed as a body and fender man. The foreman reports that he gets

along well with his co-workers and that his work is very satisfactory. The ratings for Case Ten are presented in Table XXI. The test rating and ratings by the foreman and instructor are identical. He is rated as being of average mechanical ability.

Case 11. This boy has been deaf since infancy. He is now eighteen years of age. He has no usable residual hearing. He concentrated his training in linotyping and has been

TABLE XXII

Comparison of Test Scores with Ratings by Shop Instructor and Foreman for Case 11

Degree of Ability	Test Rating	Foreman's Rating	Instructor's Rating
Excellent			
Above Average	×	×	
Average			×
Below Average			
Poor			

employed for a short time as a linotype operator and press feeder. The foreman reports that he gets along well with his co-workers. The ratings for Case Eleven are presented in Table XXII. His ratings on the tests and by the foreman are identical; both rated him as above average in mechanical ability. The instructor rated him as being of average ability.

Case 12. Case Twelve is nineteen years of age and has been deaf since infancy. He has some residual hearing for the low frequency sounds. He concentrated his training in the woodworking shop and is now employed as a machine operator. The foreman reports that he gets along well with his co-workers. The ratings for Case Twelve are presented in Table XXIII. Both the foreman and the instructor rated this boy as being of excellent ability mechanically. The test rated him as being of above average ability.

Summary. Summarizing the results from the twelve cases presented above, we find that the average of the test scores and the ratings by foremen are identical for nine cases. For the remaining three cases the test scores rated the subject lower than did the foreman and instructor. Only in Case

Five is there a wide discrepancy. In this case both the foreman and the instructor rated the subject as excellent and on the tests he rated as below average.

The number of cases is small and conclusions can not be drawn from the foregoing data. However, it is a significant

TABLE XXIII

Comparison of Test Scores with Ratings by Shop Instructor and Foreman for Case 12

Degree of Ability	Test Rating	Foreman's Rating	Instructor's Rating
Excellent		×	×
Above Average	×		
Average			
Below Average			
Poor			

indication of usefulness when, even in twelve cases, the test results are seventy-five percent identical with foremen's ratings.

Summary and Conclusions

In order to provide adequate guidance for the hypacousic it is necessary to evaluate objective techniques which might be applicable. The purpose of the present study has been to evaluate the usefulness of objective measures of mechanical aptitude in guidance programs for the hypacousic. The following summary outlines the procedures and findings of the study:

1. The Stenquist Test, Test I, The Minnesota Paper Form Board, Series AA, The Minnesota Spatial Relations Test, Boards A and B, and The Minnesota Mechanical Assembly Test, Sets I and II were selected for evaluation.

2. For purposes of experimentation, eighty deaf boys ranging in age from twelve to twenty-one were selected from the New Jersey School for the Deaf. To determine whether etiology affected performance with respect to mechanical ability, a comparison was made between subjects congenitally and adventitiously hypacousic.

3. To assure uniformity of results all the testing was done by one examiner. The Minnesota Spatial Relations Test and The Minnesota Mechanical Assembly Test were individually administered. The Stenquist and The Minnesota Paper Form Board Tests were administered to groups of not more than eight at one time.

4. The test results were analyzed statistically to determine whether the group means and distributions deviated markedly from theoretical and empirical expectations. The atypicality of the error scores on The Minnesota Spatial Relations Test was the only unusual deviation.

5. To determine whether these tests were sufficiently in agreement with each other when applied to the hypacousic, inter-test correlations were computed. With the exception of the error scores on the Minnesota Spatial Relations Tests these correlations were within limits of statistical significance and revealed that these tests might be considered valid measures.

6. To determine the validity of these measures further, when applied to the hypacousic, rank order correlations were computed between the test scores and ratings by shop instructors in printing, linotyping, metal work, photo-engraving and woodwork. With the exception of the error scores on The Minnesota Spatial Relations Test, each test correlated significantly with rankings in at least two shops. These results disclosed that the measures evaluated have predictive value in guidance of the hypacousic.

7. An attempt was made to secure an indication of the extent to which these measures predicted success in an actual work situation. Ratings by foremen were secured for twelve subjects now employed. The test results were in exact agreement with the foremen's ratings in nine of the twelve cases; in only one case is there marked disagreement. The number of cases is small. However, these results substantiate the findings relative to the validity of these measures when applied to the hypacousic.

8. The inter-test and rank order correlations disclosed that Set I of The Minnesota Mechanical Assembly Test is more valid than Set II, when applied to the hypacousic.

9. The results from the Stenquist and Minnesota Mechanical Assembly Tests indicated that hypacousic boys are inferior to normally hearing boys on tests involving specifically mechanical objects. The results from the time scores on The Minnesota Spatial Relations Test and the results from The Paper Form Board Test disclosed that hypacousic boys are equal to normally hearing boys on tests involving discrimination of sizes and shapes.

10. The comparison of the results from the congenitally and adventitiously hypacousic disclosed that etiology is unimportant relative to its effect on mechanical ability. No significant difference exists between the mean scores for these groups. From the point of view of guidance it is the fact of deafness rather than the type of deafness which is relevant. The distribution curves, however, indicated that the characteristic bi-modality of distribution curves for the hypacousic can be explained by differences existing between the two etiological groups which comprise this population.

11. The error score results on The Minnesota Spatial Relations Test did not correlate significantly with the other measures, nor with the shop instructors' ratings. These scores were not significantly indicative relative to a deaf subject's mechanical ability. However, these results did suggest pertinent differences between deaf and normally hearing boys. The findings suggested that hearing subjects engage in mental trial and error processes while attempting a solution and deaf subjects engage in manual trial and error processes while attempting a solution. The error scores suggested further that hypacousic boys are less cautious and auto-critical relative to their approach to the problem presented by this test.

12. Further research is necessary to clarify the various aspects of the usefulness of objective measures of mechanical ability in guidance of the hypacousic. The findings of this study disclose that the measures evaluated would be useful in predicting vocational success for these subjects. The implied potentialities of this finding is of considerable consequence. The guidance counselor will be able to predict within known limits of accuracy the advisability of a subject's pursuing a certain shop training course. Subjects who

will not be able to profit by such training can be eliminated and suitable courses instituted for them.

The findings indicate that hypacousic boys are only slightly retarded in mechanical ability as compared to normally hearing boys. Contrasted with the marked educational retardation this is significant. Emphasis on vocational training would seem to assure that deaf boys would be more able to compete adequately in later life. However, the deaf are not specially endowed with mechanical ability as some educators have maintained. They present as wide a variation of mechanical abilities as do the hearing. The objective measures evaluated in this investigation can be utilized in determining individual differences, and guidance relative to vocational training might be more effectually achieved at an early age.

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An Oral School in Kentucky One Hundred Years Ago

GEORGE MORRIS MCCLURE, M.A., LITT. D.
Kentucky School for the Deaf, Danville, Ky.

AROUND the turn of the century the writer contributed to *The American Annals of the Deaf* an article entitled "The First Oral School West of the Alleghenies," being a description of the school founded by Rev. Robert T. Anderson in 1844, near Hopkinsville, Ky. The school was unique in that Mr. Anderson attempted to educate deaf and hearing children together, and claimed to "teach the deaf and dumb to talk."

The article came to the attention of Dr. Alexander Graham Bell who was much interested in teaching of speech to the deaf. He had never heard of the school before, but his interest was at once aroused and he wrote asking for further information. The Doctor had a theory that the ideal school for the deaf was one where the deaf and hearing children would be educated together, so Rev. Mr. Anderson's plan appealed to him strongly. So interested did the Doctor become that he engaged a special agent, Miss Mary S. Breckinridge, once a teacher in the Kentucky School, to do research work in an effort to trace the history of the school and collect data concerning it, its founder, pupils and methods. An idea of the keenness of the Doctor's interest may be gathered from one of his letters at this time:

1331 CONNECTICUT AVENUE,
WASHINGTON, D. C.

May 9, 1905

Mr. George M. McClure,
School for the Deaf,
Danville, Kentucky.

Dear Mr. McClure:—

Allow me to thank you personally for the photograph of the late Robert T. Anderson which has been handed to me by Miss Breckinridge. It has now been placed in the Volta Bureau and I think it would be a good thing to have a specimen of his handwriting preserved with it at the Volta Bureau. Could you not send me the original manuscript headed "Education," a copy of which you were kind enough to forward to me some time ago. Handwriting reveals

character almost as much as a photograph, or if you value this manuscript too highly to part with it, could you have it photographed at my expense in Danville. If you care to send me the original, I shall be very glad to present you with a photographic copy of it which might perhaps serve your purpose as well as the original.

Miss Breckinridge left here a couple of days ago for Richmond in search of some genealogical material relating to the Anderson family which will supplement your most interesting article in the Annals. I feel we owe you a debt of gratitude for having revealed the existence of an almost forgotten school.

Yours very sincerely,
ALEXANDER GRAHAM BELL

Miss Breckinridge's researches covered a period of several months and took her into three or four adjoining states. She met and interviewed a number of Mr. Anderson's former pupils, and visited the relatives of others. She uncovered many interesting facts, but her health failed before she had completed the work and she resigned.

The data collected was turned over to the Volta Bureau in Washington, Miss Breckinridge was kind enough to pass on to the writer some of her discoveries, and these, with other information kindly furnished us by several members of the Anderson family seem to call for an expanding of the article as published in *The Annals*, in order that the record may be kept straight.

* * * *

Rev. Robert T. Anderson of Caroline Co., Va., came to Green Co., Ky., in 1818, but later removed to Glasgow, Barren County where he opened a school. He was one of those ubiquitous Scotch-Irish teachers who followed the westward march of the American pioneers and caused raw frontiers to blossom with academies and pretentious schools of higher learning. It was while teaching at Glasgow that the idea of teaching the deaf to speak first occurred to him. There was a deaf boy in the neighborhood who frequently accompanied his brother and sister to school. The plight of the boy, sitting idly by while all the other children were busy with their lessons, was one to challenge the humanity as well as the resourcefulness of a true teacher. Mr. Anderson set himself to attempt the child's education, and by the only method he knew—speech.

There were no oral schools in this country then, and he

knew nothing of the method used by such schools in Europe; he was required to blaze new trails. But he was intelligent and resourceful, and being very much in earnest, he devised a "home made" method that worked, apparently. His grandson, Mr. W. A. Anderson of Wickliffe, Ky., gives us a hint of what the method was, "He taught the sounds of the words by showing the pupil how to fix the organs of speech," and Mr. Clarence Anderson, of Hopkinsville, who went to school to his uncle in 1849–50 and had several deaf schoolmates, describes the method of teaching, this way: "He taught the deaf to talk by (observing) the motions of his lips and tongue, each letter having a particular movement of the tongue or lips."

The boy at Glasgow was bright, and progress in speech as well as in the three R's was so satisfactory that Mr. Anderson conceived the idea of adding a department for deaf to his school. Before doing so he went back to Virginia to check up on his methods with Rev. Mr. Kirkpatrick of whom he had heard as an associate of John Braidwood in the short-lived oral school at Manchester, Va., established in 1812–16 —the first such school in this country. Mr. Kirkpatrick was impressed with Mr. Anderson's method saying it was very similar to that of Braidwood and bade him "go ahead." When Mr. Anderson came back to Kentucky he decided to move his school to a farm in Christian County, near a village called Garrettsburg, a few miles south of Hopkinsville. Here he built a home for his family, dormitories for boarding pupils and a big log-school-house on the lawn fronting the other buildings. Most people today would consider the site selected an unfortunate choice as it was surrounded by forests, in a sparsely settled section, the nearest large town, Hopkinsville, being twelve miles away. But as Emerson says, if a man can do things a little better than any one else, no matter where he lives the world will make a beaten path to his door. The school acquired an excellent reputation and prospered until the death if its founder in 1854 caused it to be given up.

Mr. Anderson opened his forest academy in 1844. The department for the deaf had several pupils in it from the

start. The news that there was a school professing to teach the "deaf and dumb" to talk traveled far and brought pupils not only from Kentucky but from other states. Mr. W. A. Anderson, of Wickliffe, Ky. whose father, Cornelius Anderson (a son of Rev. R. T. Anderson) was an instructor in the school says that in 1845–46 there was present one pupil from Alabama, two from Mississippi, one from Indiana, five from Missouri, and nine from Kentucky, "and perhaps others." Miss Nellie Anderson, granddaughter of the founder, says there were pupils from Texas and Wisconsin.

There appears to be no complete list of the pupils of the school extant, but Miss Breckinridge came across a partial list in the home of a relative of one of the pupils, Newton Trotter, at Carrollton, Mo. Here is a copy of the list:

The boy at Glasgow, whose name I have not yet learned.
Ann Angel, of Louisiana.
Benjamin Gilkey, of Mt. Sterling, Ky.
Sophia Dobbins, of Carrollton, Mo.
Nancy Hambleton, of Cloverport, Ky.
Lucy Ann Hughes, Glasgow, Mo.
Robert King, of Lexington, Ky.
Andrew Moore
Fannie Roberts, Mobile, Ala.
Henrietta Sypert, Christian Co., Ky.
Jacob Todhunter, of Fayette Co., Ky.
Newton Trotter, of Carroll Co., Mo.
George, William, and Hiram Thornton, of Johnson Co. (?) Mo.
——— Van Metre
William Williams, of Mississippi.
——— ——— (a boy with sore ears.)

There was not much money in frontier communities so charges by teachers were modest. A copy of Mr. Anderson's first prospectus, issued in 1844, has come down to us. Fifteen dollars a session for instruction in Latin and higher mathematics would make even an underpaid teacher of today lift his eyebrows and $20.00 a session for a deaf pupil surely was "dirt cheap."

EDUCATION

October 8th, 1844

Robert T. Anderson will continue his school, the next year, at his residence. To commence (Deo volente) on the 15th of Jany, 1845. His terms, as usual, $8. a session for scholars learning orthography, reading, writing, arithmetic.—$10. for those learning Eng., Grammar Geography and the use of the Globes.—$15. for those learning the Latin Language, surveying, measuration of heights and distances, Trigonometry and other branches of mathematicks, Belles Lettres, etc.—$20. for the Deaf & Dumb. His son, Cornelius will assist him.

Subscribers will be considered bound for their subscriptions.—Will the people sustain a school at home, or import Foreigners every year to teach their children?

The deaf department of the school must have prospered, for a circular, printed the next year makes some ambitious claims for its oral work.

EDUCATION
OF
THE DEAF AND DUMB:

By R. T. Anderson & Son.

We teach them to TALK as other children do: first, to sound all the letters of the Alphabet, and then to SPELL and READ, pronouncing clearly. If any doubt this, let them come and see and hear.

We go on to teach them Writing, Arithmetic, Grammar, Geography, &c. &c.,—and to read the Bible.

TERMS.—Per Session of five months, for board and Tuition, $50 in advance. Our Post-Office is Garrittsburg, Christian County, Ky.

Nov. 10, 1845 ROB'T. T. ANDERSON

P.S.—Our School is not confined to the DEAF AND DUMB; we teach others also. For the next year, the Term will commence on the 15th of January, 1846.

The challenge "If any doubt this let them come and see and hear" is a bold one, and we wonder if the Reverend gentleman was always able to convince the doubters. In fact his grandson, Mr. W. A. Anderson says: "My grandfather did not receive the credit that was justly due him for his work. While he talked with the boys and girls just as though they were not deaf, still he could get no one else to agree that it was practicable to teach them orally."

Mr. Clarence Anderson, the nephew mentioned above, in giving some reminiscences of his school days, says of one of the deaf students "I remember that there was a young man there who was entirely deaf, but could go to church and give a pretty good idea of the sermon by watching the movements of the preacher's lips."

The sign language crept into the school as it usually does in all schools for the deaf. Mr. W. A. Anderson says of his grandfather: "He used no conventional signs. The pupils communicated with each other about the place by means of signs and spelling with the fingers, but that was not used in the school room." Practically all the State Schools of today

take a like attitude toward the use of signs. The "pure oral" schools are stricter and claim that no signs are used at the schools, but sometimes this assertion is only a bit of "wishful thinking" on the part of those in authority.

Was the school successful in its attempt to teach speech to the deaf?

Perhaps, before asking whether the speech work of any given school is a success we should inquire "What *is* success?" Schoolmen themselves are not agreed. Some claim that even a limited degree of speech, though it be halting and unintelligible to the man in the street, is worth the time and effort spent in its acquisition, if it is understood in the home circle. Others set the standard of success at speech that will pass its possessor in shop, store, and office as well as among members of the family.

Some of Mr. Anderson's pupils afterward transferred to the school at Danville, and Supt. J. A. Jacobs, in one of his Reports to the Kentucky Legislature expressed an unfavorable opinion of the attainment in speech saying that little appreciable success had been achieved. Mr. Jacobs' long experience as an educator of the deaf gives weight to his conclusions. However, in justice to Mr. Anderson, it should be pointed out that it takes many years of persistent instruction to give speech to the congenitally deaf. In the schools of today the pupils are in speech classes constantly from ten to fourteen years, if they remain until they graduate, and even then some of them may turn out to be doubtful oral successes.

But Mr. W. B. Anderson of Elliott, Mo., who attended his father's school and had several deaf young people as schoolmates, says: "It is true that many of them failed to learn to talk, but this was owing to the short time they stayed for instruction." Looking back after fifty years had elapsed, he wrote: "And now, at this remote period, with all my recollections still vivid I must say his effort was a success."

And Mr. Robert H. King of Lexington, Ky., who attended the Anderson school before coming to Danville wrote:

Lexington, Ky.
May 19, 1907

Dear Mr. McClure:—

Replying to your letter of the 15th., I must confess that I remember but little of Rev. Robert Anderson's school. I was about seven when I went there. His farm was in Christian County, near Genoa, about ten miles from Hopkinsville, in the midst of the woods, and his frame and log dwelling and log school house were at that time the only improvements within several miles of the vicinity. He taught a sort of country school for women and men, girls and boys, and also for a few deaf mutes. In this latter effort he seemed successful. His mouth was so large that any one could understand the motion of his lips.

I think several deaf mutes had attended this school before I went there. Among them is the venerable Jake Todhunter, now about eighty years of age. Ben Gilkey, of the Missouri Institute, and his wife, and another young lady, whose name I do not remember, were my school mates there. I do not know how long they remained there.

But it is to his credit that I learned to talk. You know I dislike to talk orally to anyone.

Mr. Anderson did not use the sign language much, but when he did it was quite natural. He also used the manual Alphabet. He was a gentleman of imposing appearance, and his motions and expressions were clear and graceful. Had he lived young, when he started this school, and in a city instead of such an isolated place, he would have, in my opinion, been one of the greatest oral teachers of the present time. He was quite aged when I went there, and did not last long I think, after I left.

I shall soon be over and talk further on the subject, now quite interesting to me.

Yours very truly,
R. H. KING

The writer was in his youth, acquainted with several of the people who attended Mr. Anderson's school. All of them had at least a small speech vocabulary, though most of them, like Mr. King, shrank from using it save with the members of their family or close friends. Though they spoke haltingly their speech was usually understandable. And they, too, gave credit for their ability to talk to Mr. Anderson and his school. As judged by his pupils the school was a success.—*The Kentucky Standard,* February, 1946.

The Next One Hundred Years*

LEONARD M. ELSTAD, M.A.

President, Gallaudet College, Washington, D. C.

AN EDUCATOR recently began his remarks with this observation, "It seems to be pretty well established that we are in the atomic age and that it is here to stay." The question now is, "Are we here to stay?" If we are not, there will be no need for us to go on with a discussion of the education of the deaf in the next 100 years. If we are, then we can well think together. This does make fascinating thinking. Certainly we should be eternally thankful for the fine pioneers who labored so hard and so well to lay the foundations of the education of the deaf child in our nation. When Dr. Thomas Hopkins Gallaudet opened the first free public school for the deaf in Connecticut in 1817, he probably could not visualize the progress which actually was to take place in the 100 years that followed. We are now in our second century of progress in this country.

Just a few years ago the Association to Promote the Teaching of Speech to the Deaf held a Golden Jubilee Convention in Providence, Rhode Island. At one session an early meeting of the Association was reproduced in costume. The original papers were read again. These same papers could be read again today. They would quite accurately describe our present day problems and even suggest the possible solutions. Does this mean that we have made no progress during these 50 years? Indeed no! It does mean, however, that great progress was made during those 50 years. Sometimes we hear these words, "The first hundred years are the hardest." This is not necessarily true. Our early educators gave us a good start during the first century. We are now faced with a problem of refining what they so resolutely produced for us. This refining process is not

* Delivered at the Illinois School for the Deaf, Jacksonville, Illinois, Jan. 26, 1946, in observance of the One Hundredth Anniversary of the founding of the Illinois School for the Deaf.

simple. There are almost as many self-styled experts as there are teachers.

Fundamentally, all educators of the deaf today are agreed that the deaf child is entitled to the best training possible in all the various phases of education. The success with which this is carried on depends to a large extent upon the awakened interests of the state educational authorities. This interest stimulates the efforts always necessary to secure adequate funds with which to attract capable administrators who, in time, will surround the children with the finest teachers, housemothers and housefathers who can all work together as a family in comfortable, adequately equipped and homelike surroundings.

There is no argument as to the value of speech and speech reading for the deaf child today. Surely that child who has come to the school without speech and who, during his training there develops speech which, though it may be far from perfect, is easily understood, has a prize of great worth in his preparation for life. A parrot can be taught to speak but it is usually the "Polly wants a cracker" speech. We do want our deaf children to speak, but we also want them to develop a language concept so full and so compelling that they will want to speak because they are filled with things to tell. Too often we get speech demonstrations which are reading demonstrations. It is fine to be able to read audibly words as they come in sentences on the page, but how well can our young hopefuls stand up and speak thoughts of their own, spontaneously produced because of the nature of the situation and the makeup of the assembly present at the time? We do not want parrots. We want children who are so language conscious that the speech, so laboriously acquired will be a vehicle for expression. You know and I know that the successes in this language respect will be no more numerous than they are in an average class of hearing pupils in a class of the same age. How many children in these hearing classes can get up and "give out" much better than deaf children do who have learned speech very imperfectly. We must always want more than we get because nothing is more deadening than smug satisfaction. Visit a

hearing class occasionally and draw reasonable conclusions.

Dr. Max A. Goldstein, that tower of strength in the speech field, once wrote:

"I am an advocate of exclusively oral training. I want every child taught speech and every effort made toward securing the best speech. I believe with some of the manualists that if you cannot get good speech you are expending much useless energy in acquiring poor speech; unless you can teach a child normal, fluent, flexible speech you are not serving the best interests in the development of pure oralism."

Much poor speech is being taught, and it can be said also that there is poor speech teaching. It is also true that in many cases nothing but poor speech is possible. It is unreasonable to assume that all deaf children can learn to speak well.

Speech reading is still a visual art, and unfortunately all deaf children are not artists. It is remarkable that so many of our deaf children get their daily lessons as well as they do by using speech reading. There is not an honest teacher in this assembly tonight who would dare to predict his or her success in getting what I am saying through speech reading were he or she deaf. I would throw in your present vocabularies, also, to make the deal a more attractive one, and yet we expect our deaf children to go from mathematics to history to geography, to this and that for six hours a day, and they are doing it with a vocabulary that will never be half as full and as useful as yours. How do they do it? I don't know but we all appreciate their patience and efforts.

Yes, we must reemphasize the value of the teaching of language. We want thinking children who are thinking in good English. Are we using our blackboards? I visited a school once where the blackboards were covered with posters and pictures. We haven't time in our educational program for space-consuming bulletin boards in our classrooms. The blackboard is the child's tablet to be used by the hour each day. There he can record his thoughts in English which not only helps him but can be a help and an inspiration to others in that class. The blackboard is an instrument which the teacher can use for a quick explanation that saves time for

more important things. A class day is a budgetary experience, too. There are many things to be done. That teacher who knows how much time to place on language, on speech, on speech reading, on writing, on composition, on action work, on play, etc., is a rare individual in any school. Too often our teachers and our administrators, principals and supervising teachers are enthusiasts for this or for that. They are faddists. They are progressives or conservatives. We cannot be extremists. We must be fundamentalists, and the prime fundamental is language for all, either read, spoken or written. The wise teacher uses that rare characteristic of balance in her classwork. While teaching language, she teaches speech, speech reading, mathematics, history, etc., or vice versa. She recognizes values. The product goes from her class with an appreciation of all work that has been covered that year. Then, if the next teacher is an extremist, one phase will be emphasized and the others will be minimized. The child loses.

Here is where the supervising teacher, the principal, and the superintendent assume the responsibility. A school is a unit. It has an air about it. You sense it as you step into the classroom. If it is what it should be, you can go where you will and not lose the oneness of the purpose. For instance, if it is essentially a school where speech and speech reading is all that matters, your visit is a series of such demonstrations. If it is a school where there is a hearing aid epidemic, you face a series of such demonstrations. If the superintendent is a vocational enthusiast, you may spend most of your time in that department. If it is a school where language is all important, you may see only language work on the boards, etc. From superintendent to teacher we have a problem to solve and the child is in between. We can toss him back and forth so that all he gets is wear and tear, or we can study him and remember that we are educating the whole child. Only then will our sense of values, based on what this child will have to confront when he faces society, be honest enough to give him a well-rounded program. To sell this whole program to a full staff is a full-sized job for any school head. You have been at it here in Illinois for a

full 100 years, and we have all been at it in the United States for 129 years.

Illinois has shown us the way in many things. It takes courage to strike out into new untried educational fields. Mr. Cloud, with your help, has pioneered in a three way approach to our problem. You have the oral approach, the manual approach, and the aural approach. You also have the preschool approach, and now you have recently added the teacher training approach to your problems. Surely this is an interesting school. It is one of the largest in our land. It is centrally located. It is one of the oldest. Your 100 years have been richly blessed. The profession looks with interest to you for the answers to many problems. We might ask you:—

Would you dispense with the manual approach and would you advise that all deaf children can be taught as well orally as manually?

Does auricular training speed up the educational advancement of the hard-of-hearing child?

Can you definitely advance the theory that preschool education enables you to turn out a better product than would be possible without this school? Or would you advise that it is your better judgment that your present system, as it now stands, gives you a greater opportunity to study the child in the preschool set-up and then to place him properly in one of the three schools where he can develop to the best of his ability?

We admire your practical approach to a difficult problem. We seek for answers to perplexing problems. Your consideration of the child is of great interest to us. We are glad we are here tonight to help celebrate your century of progress.

What of the next 100 years? Your guess is as good as mine, but there are trends.

In the first place, there are fewer and fewer deaf children who fail to attend school because of the parents' lack of knowledge of what is available for the child. The number will continue to be even smaller in the very near future.

There is and will continue to be an ever increasing interest in the deaf child because medical schools are stimulating

the interest of their students in the educational phases of deafness through lectures to their seniors, through regular visits to the schools for the deaf, and through their work in children's hospitals where our deaf children are patients at various times. This tendency will be intensified and school heads should aid in the promotion of this trend. The doctors must be conscious at least of what we are doing so that their advice to parents can be frank and honest. Valuable years are saved thereby.

Testing techniques in the offices of physicians will be more thorough and reliable because audiometers will be in every office. Nurses in these offices will be trained to test hearing. It will be routine practice.

We have thrilled at the accomplishments of the medical profession. The fenestration operation is helping many. We can look forward to more work along these lines where the nerve is still functional. Nerves of the body have been replaced in certain cases where accidents have severed them. Can we hope for replacement of the nerve of hearing? Who would dare to say no? The next 100 years may surprise us.

There will be testing clinics at different accessible points in all states sponsored by federal, state, county, or veterans' agencies. The parents will bring their children to these clinics. An otologist of known reputation will be a part of this clinic so there will be not only a test but an analysis of the test and recommendations made as to treatment and to the educational needs of the child. The parents will accept this advice because it is the combined judgment of those in authority.

All education of the auditorially handicapped child will be under the educational authorities in the state. There will be a fully planned program for all children with impaired hearing. This means that each state will have a supervised program so that the residential school and the day school will carry on a uniform standardized course of study. There can then be an interchange of pupils and teachers without loss of time and learning efficiency. There will be a better understanding between day schools and residential schools because of this unified supervision.

There is a real fear in the hearts of many educators that

Federal Aid will ruin our schools. This need not be a worry. Our educational needs will cost more and more. The Federal Government must be prepared to help support education. Federal Aid through land grants and other types of aids has shown that Federal assistance can be given in such a way as to encourage better education without direct control. The Smith-Hughes Act provides a much appreciated boost. We do not want the Federal Government to tell us what we should teach, but the Federal Government can encourage citizenship studies by financial grants but still leave the details of the courses to the different state and local controls. The Federal Government can encourage the preparation of experimental materials not provided by commercial book companies. Much of the printed material needed in our profession is absent because of the limited market. The Printing House for the Blind is a Federally controlled agency. It is doing a grand work. Perhaps private agencies could have done this, but they didn't.

There will be a trend toward the use of the individual hearing aid because of the improvements in this aid. The "walkie-talkie" of the armed services has taught us much. We see better through the use of eye glasses. There are refinements such as bifocals, etc. Why cannot we look for refinements in individual hearing aids? This situation is nearer actuality than we know, and the cost will be less because there are as many potential hearing aid users as there are users of eye glasses. But we must remember that ten pairs of eye glasses will not help a blind person to see better; and ten hearing aids will not help a person who is absolutely deaf to hear better.

There will be better examination procedures and fitting services so that an aid will be as accurate for the ear as our eye glasses can be for the eye.

There will be fewer and fewer hard-of-hearing children in our residential schools. The public school child with eye glasses will sit side by side with the public school child with his hearing aid. The one will break his instrument as easily and as often as the other, but parts will be no more expensive for the one than for the other.

There will be more use made of moving pictures in our

work. Visual aids of all types will be utilized. Speech reading practice lessons will be available on endless reels for private practice work in darkened rooms. Film strips were of great value during the war for rapid educational teaching. We will use more of these aids.

From time to time new educational aids will be brought out. Some twenty years ago extensive experiments were made with respect to the tactile sense reaction to speech. For a time it was hoped that this would be an answer to our prayers for an aid to speech reading. It didn't prove to be a practical aid, however. There have been several visual aids, the latest being a product of the Bell Telephone Laboratories called "Visible Speech." The trouble with such instruments always has been that even simple vowel sounds were not easy to identify because the waves were too complicated. Some way had to be found to select essential information and display it in an orderly fashion. After this was possible the idea was that the hard of hearing would be able to use the telephone and converse by "visual hearing." As speech is recorded, time extends horizontally on the record. Frequency extends vertically and intensity is shown by varying shades of gray. Speech of men and women records a very similar picture. Some way must still be found to indicate voice pitch. Unless pitch and volume are controlled, the deaf and even the hard of hearing will not be able to speak naturally. Certainly this latest scientific aid to better speech and better understanding of speech is worthy of our careful consideration. We must always be on the alert for aids, but, while we are on the alert for the new, let us not forget that what we are now doing from day to day has brought us to the place in education where we are today and we must everlastingly be at it.

We have a right to expect great things from television. The radio has been wonderful for the hearing. It must have been a constant source of irritation to the deaf because of the utter lack of value it held for them. Television will be of some help in this field.

Textbooks will be written that will be more effective. There is a trend towards simplified vocabularies. This can-

not come too rapidly. Simplified spelling would also help. This may come. We can well hope so.

We should be very thankful for the hundreds of fine deaf teachers who have meant so much to the education of the deaf child down through the years. The teacher shortage during the war years was made easier because the deaf were willing to step in and help. Our future plans must include teacher training classes for the deaf who want to enter the teaching profession. These classes must be as attractive as those offered the hearing candidate.

We will experience a short-lived era of testing whether our so-called "combined" schools are "on the beam" or not because of the influx of service trained hearing aid men and women and speech reading instructors from the armed forces, who, not knowing our problems, will lay all their emphasis on these phases of the work. They will go into public school speech correction work, and rightfully fill a great need there. They definitely feel that we are on the wrong track, but we can accept their judgment only when they have lived our problems with us. There is always need for understanding. I sometimes feel that no teacher or principal or administrator should try to influence those who have not faced the same problems. A little knowledge is a dangerous thing, and when we are dealing with living growing youth we can well be always learning and exceedingly modest.

I believe in the future, the next 100 years, if you please, that the individual is going to be recognized as such. Unfortunately, today whole programs for the education of the deaf child are based on what has been successful with a few isolated unusual individuals. We will always have that unusual individual, and we make a mistake when we call him average and use our experiences with him as proper procedures for all. We are coming to the time when those who can will go faster, and those who cannot go as fast can still find a place where procedures are geared to their capabilities. The sins of commission in this area have stunted the educational advancement of many a child. We have been too blind to see.

There will eventually be one large Association of Instructors of the Deaf with sections for the various fields in our educational program. We will see more nearly eye to eye as a profession and grow thereby in influence in the larger educational picture.

Our vocational work will become more and more prevocational, realizing that the individual schools cannot keep abreast of a machine age in so far as equipment and calibre of instruction are concerned. We will emphasize attitudes and aptitudes and impress our young folks with the value of learning how to live together and how to work together. Now we are not only interested in national unity, but World War II has shown us that we must develop a spirit of international unity and cooperation.

There will be an apprentice system where schools are located suitably for the use of this practice. Pupils will learn on the job and will make the final transfer to the job naturally and effectively.

It is encouraging to note that religion has had a place in the educational program. Future educational planning along this line will be made easier because the different church bodies are more and more realizing their responsibilities to the deafened adult. There is need for more deaf clergymen and hearing clergymen trained to work with the deaf. Anything we can do to encourage this trend should be done and immediately.

I would like to devote some time to higher education for our students. We are in the midst of a survey at Gallaudet College. It would be out of place for me to picture for you tonight a possible Gallaudet of tomorrow. We expect fine results from this survey. Studies are being made along lines of educational standards, physical plant, financial structure, location, etc. The best thought of the country is being included and this includes the thinking of hundreds of graduates who are out in the world using what they have learned at your schools and at Gallaudet. We hope results of this survey will be available to you by June 1.

Our exceptional deaf men and women will continue to do graduate work at colleges and universities in our nation.

They will acquit themselves with credit as they have done in the past. These will continue to be exceptions, and our thoughts and plans must not only revolve around their needs, but also upon the needs of these who complete the regular courses in the college.

This survey must take into consideration the preparation received by these college entrants in your various schools. Should you have standard high school courses recognized by the accrediting agencies, or should you carry your pupils so far and let the college preparatory course make up the difference? These are momentous questions because you must decide where your emphasis should be placed. Are you organized for the few or for the many? How much can you take from the many to provide the few with the necessary added instruction to pass college entrance examinations?

Is it reasonable to suppose that an increasingly large number of our students will go into hearing high schools and colleges? Facts and history do not seem to stimulate much encouragement for the many along these lines. Those who can should. Perhaps more can than do, but the majority cannot and Gallaudet is for them. My efforts will be for a finer Gallaudet. It has had a glorious history. It can have a glorious future. It is your college and my college. Let us work together for its greater future.

We are faced with a serious teacher shortage today, more serious than we may realize. We can well think seriously about this. Salaries are higher. Can we hold them where they are and then raise from there? They are still not where they should be. We cannot attract the best unless we pay well. Professional spirit is an essential asset, but it must be fed by financial support. Training centers want training material. Look about you and send fine men and women to our training centers. The need is great and the supply is less than limited.

We will have, in the not too distant future, a central research agency which will act as a central information center from where vital statistics and information of all kinds will be sent out on demand. We need this and the need will

encourage the establishment of such a service. Our profession will eventually become a welded unit of force, so that we will be recognized for what we are and not be victims of an attitude of "I wonder who they are?" A specialist knows all there is about his line. Do we? We must to succeed in the turmoil of the next 100 years.

The deaf will continue to live together socially. It is true that there will be those who may try to carry on their social lives with the hearing public. This will not increase in effectiveness because it is still a strain for the recently deafened and expertly trained speech reader to successfully make this experience practical and satisfying. Our deaf friends have made wonderful strides in these 129 years. They have their organizations and their churches. They marry. They raise families and educate them. They hold down jobs and pay taxes and form, in general, a substantial part of our national life. There are those who look down on all this with suspicion. They think of us who support these trends as being all wrong. We have but to ask, "Who are living these lives?" We may have poured them in molds as they grew up in our educational lives as youngsters, but when the molds are removed they must be able to live a life. Let us be honest. The general public, and the proportion is approximately 10,000 to 1, is not going to be concerned with this one as a day to day proposition. The deaf can understand this. Why can't we? Let us go to our products and ask them. They will tell us the truth and the truth will bring us together. I like this thought in these lines:

Not understood!
We gather false impressions
And hug them closer as the years go by
'Til virtue oft seems to us transgression;
And thus men rise and fall and live and die
Not understood!
Oh God, if men could see a little clearer,
Or judge less harshly when they cannot see;
Oh God, if men could draw a little closer to one another,
They would be closer, then, to Thee,
And understood!

Notices of Publications

P. V. D.

I. R. Ewing and A. W. G. Ewing, Department of Education of the Deaf, University of Manchester, "The Ascertainment of Deafness in Infancy and Early Childhood." Reprinted from *The Journal of Laryngology and Otology*, Vol. LIX., No. 9, September, 1944.

The authors of this excellent reprint on testing are firm in their conviction that there is a need to study

"further and more critically methods of testing hearing in young children. During the first year of life the deaf baby's voice has natural quality and inflections. Gramophone recordings of the vocalization of deaf infants up to age one year are indistinguishable from similar recordings of infants whose hearing is unimpaired. But even during this first year the existence of deafness needs to be ascertained. Experiment has shown that skilled training can do much to conserve normal voice habits, once the need for it is known. It has also proved possible to begin to develop in children of two years and under the capacity to comprehend speech through lip-reading, or better still, where partial hearing exists, through hearing combined with lip-reading."

In commenting on the advancement in the preschool in schools for the deaf in England the authors, although enthusiastic over the Education Act of 1944 which places an obligation "on local authorities to admit deaf children to special schools at two years if the parents desire it," believe that "training needs to be begun at the earliest age that the diagnosis of deafness can be established," which the authors believe is at an age earlier than two years. It is the conclusion of the Ewings that speech and voice tests are a reliable means of detecting deafness in children in infancy and early childhood, and that from the results of these tests one should offer more accurate suggestions as to the special educational treatment each child would need in the future.

Verne K. Harvey, M.D., Medical Director, U. S. Civil Service Commission, and E. Parker Luongo, M.D., Assistant Medical Director, U. S. Civil Service Commission,"

Physical Impairment and Job Performance," A Comparative Study of Accident Experience, Production and Efficiency, Sick Absenteeism and Turnover Among 2,858 Physically Impaired and 5,523 Able Bodied Workers in Government Industry. Reprinted from *The Journal of the American Medical Association*, April 7, 1945, Vol. 127, pp. 902–907 and April 14, 1945, Vol. 127, pp. 961–970.

Dr. Harvey and Dr. Luongo have made a comparative study of 2,858 physically impaired workers and 5,523 able bodied workers employed in forty-three establishments of the War and Navy Departments in various parts of the country. This study is of importance to government bureaus at the present time because of the great number of men and women being injured in the war. As the authors say,

"Advancements in medical science are saving lives, but the number and severity of the injuries being sustained by members of the armed forces are such that this nation will be faced with the greatest problem of rehabilitation in its history."

In regard to the deaf and to the hard of hearing in the study the authors declared that

"Hearing defects occurred at a rate of 7.6 per cent among physically impaired males and 12.4 per cent among females. The hearing defect group included both the deaf and the hard of hearing.

With regard to the deaf, cases were limited to those in which the residual hearing was nonfunctioning for ordinary purposes of life, the residual hearing in these cases being less than 1/20 in either ear. Practically all cases were without normal speech function; the cause was approximately evenly distributed between adventitious and congenital causes.

Cases of hard of hearing were limited to those in which there was some hearing but insufficient to carry on ordinary conversation at 10 feet or less without a hearing aid. This group included a large number of cases in the older age range in which the hearing defect was due to otosclerosis; however, in the great majority of these cases the hearing defects resulted from complications of childhood infectious diseases and to meningitis."

One of the main points in the study was the stress placed on the fact that "improvement in safety devices alone will not be adequate to meet this problem." Studies made by the National Research Council and the Industrial Board of Great Britain show "that from 80 to 90 per cent of all accidents are not due to defective machinery, physical or mental defects or to lack of skill but to an X factor in the

person injured." This X factor although found in able bodied workers seemed more pronounced in the physically impaired, especially those with certain types of physical defects, which possibly accounted for the fact that "the average accident frequency rate for the physically impaired was found to be higher than the average frequency rate for the able bodied." This X factor can be detected by testing, in both the able bodied and handicapped group which would possibly cut down greatly the number of accidents.

In productivity, both in quantity and in quality, in absenteeism, turnover, job changes, special considerations, and advancement in job earnings, the physically impaired group compared most favorably with the able bodied, and in one or two cases even presented a better rating.

Education for All American Youth, ed., Educational Policies Commission, National Education Association of the United States and the American Association of School Administrators, 1201 Sixteenth St., Northwest, Washington 6, D.C., 1944, pp. 421.

This publication devotes 3 pages to the future education of the handicapped in the United States. Very little is mentioned specifically about the deaf and the hard of hearing except the fact that outside of a few who will be placed in special institutions all such students will in the future be educated by the use of lip reading and hearing aids in the regular public schools for the hearing. As for teachers of the deaf and of the hard of hearing the work is so general as to be of very little immediate value.

Harvey, Verne K., M.D., Medical Director, United States Civil Service Commission, and Luongo, E. Parker, M.D., Assistant Medical Director, United States Civil Service Commission, Washington, D.C., pamphlet, "Physical Capacity for Work," Principles of Industrial Physiology and Psychology Related to the Evaluation of the Working Capacity of the Physically Impaired, reprinted from *Occupational Medicine*, American Medical Association, January, 1946, Vol. 1, pp. 1–47.

This is the third report of Dr. Harvey and Dr. Luongo given over to the United States Civil Service Commission's program for employment of physically impaired persons. "It was hoped," according to the authors," that this procedure would establish criteria which could be used in the formulation of a permanent policy of the Commission with reference to minimum physical standards for employment." In regard to the deaf and the hard of hearing specifically, Dr. Harvey and Dr. Luongo stated that

"In employees with hearing defects, as in those with other defects, the loss of working capacity does not diminish in direct proportion to the degree of impairment but is relative to all other factors in the individual case. There can be no absolute matching between degree of hearing loss and job requirements. (59) Many extenuating circumstances will affect the capacities of the deaf and the hard of hearing; foremost of these is the individual adjustment to the defect. Lists of jobs suitable for persons with impaired hearing, while having value only in a suggestive sense, are useful in the ordinary case of a person who must look for work in which hearing is not essential. If this person displays an unusual degree of ingenuity and adjustment, his vocational aptitudes are more important in evaluating his capacity for work than listings of jobs in which hearing is not essential.

A common misapprehension with respect to persons with hearing defects is that they are all on a common level or that one of them is representative of a class. In reality, the deaf and the hard of hearing differ among themselves as much as persons in entire possession of their auditory senses. (60) Much has been written recently about the personalities of the deaf and the hard of hearing, but none of the work done with regard to testing the personalities of these persons is conclusive. Welles (61) learned, from a preliminary study, that the hard of hearing generally agree that there is a real difference between themselves and the hearing world, but as to the extent of this difference there are widely diverging views. Best (60a) indicated that little is known concerning the relationship between deafness and mental ability. He asserted, however, that in a small segment of the deaf group there is distinct mental retardation or regression and that the disease that caused the deafness may also have produced the mental symptoms.

Deafness.—In discussing the working capacity of the deaf, we must distinguish between the congenitally deaf, who lost their hearing before speech developed, and the adventitiously deaf, who retain memory of sound patterns acquired while they had normal hearing. Even when memory for sound patterns is retained, it must be admitted that complete deafness may be a severe handicap. (60a) The remaining faculties, however, as a rule become developed above normal and in a certain measure become substitutes, or at least partial substitutes, for the lost powers. We find among totally deaf persons, architects of the highest rank, writers of keen ability and insight, chemists of national repute, artists, librarians, teachers, dentists, machinists, printers and engravers. (62) The deaf do exceptionally well in the printing trade; a large number are employed as linotype operators. Even though deaf workers have participated

in a variety of occupational fields, they still remain unique in that no satisfactory mechanical device is known at present which can give them much assistance. (62) The hearing aid is of great benefit to the hard of hearing, and the line of demarcation between the deaf and the hard of hearing is strongly drawn in this respect.

While some pursuits are not suitable for the deaf, there are others not dependent on hearing and speech in which deaf persons have good chances of satisfactory employment. In this connection, they have an unusual advantage in that most of them have attended special schools where good industrial training, with an opportunity to learn a trade, is offered and is generally taken advantage of. (60a)

The only reliable method of obtaining an insight into the capacities of deaf applicants is that of studying a history of their work or training. With respect to obtaining a history of work, Bluett(59) suggests the following questions:

1. How did the applicant obtain his first job?
2. Why did he leave that job?
3. What was the next job?
4. How long did he work on the next job and just what did he do?

These questions may bring about a good insight into the deaf person's current capacities. Use of this information in connection with placement and follow-up on the job furnishes an equitable basis for the employment of the deaf person.

In studying positions suitable for the deaf in the federal service, we found that there were placement potentialities for them in 1,269 of 5,100 types of positions studied. The job performance of deaf workers—productivity (both quality and quantity) and efficiency—was found to be as good as that of the normal ones. With regard to their safety records, we found that psychologic factors in individual cases may produce an accident rate higher than that of persons with normal hearing. These psychologic factors can be met with, however, by careful investigation of personality in the individual case.

Impaired Hearing.—Among persons who are hard of hearing, the use of a hearing aid has afforded the same benefit as scientifically selected lenses afford among persons with visual defects, and often the personality problems of some of them will disappear when they have been properly fitted with hearing aids. Persons with as much as 80 to 90 decibels of auditory loss may benefit from hearing aids. (59) In the selection of hearing aids, audiometric charts interpreted by an otologist will give the best assurance of a satisfactory type of instrument and proper fitting.

A hearing aid is not a full guarantee of satisfactory performance of work. Some users of hearing aids, with pathologic alteration of the middle ear, will perform efficiently and safely under noisy conditions, while others, with impairment of the auditory nerve, may be extremely sensitive to noise. In some types of work, users of hearing aids may have to turn their instruments off, since high frequencies of noise may become a source of constant irritation, or even intolerable. Contrariwise, persons with certain types of advanced hearing loss, who cannot be helped with hearing aids, may prove more efficient than normal workers on noisy jobs; their hearing will not be further injured, and they will not suffer the serious effects of noise-induced exhaustion so common among workers with good hearing. Persons with severe pathologic involvement of the middle ear frequently report that they can hear better in noisy environments.

Additional Factors Affecting the Working Capacity of Those with Impaired Hearing.—There may be complications in the state of the hard of hearing which must be taken into account in evaluating

capacity for work. If a hard of hearing person is subject to vertigo, he cannot work in an environment in which there is danger of his falling from a high place or into machinery. The person with impaired hearing also might have an unusual susceptibility to fatigue. If he has to strain to catch what is said, he may remain almost constantly in a state of tension that is extremely wearisome. The undue fatigue may in turn cause nervousness and decline in general health. A combination of tension, fatigue and nervousness is sometimes the most difficult problem to solve in effecting the rehabilitation of a hard of hearing person. (63) The fatigue might be accentuated if the person's hearing impairment is due to involvement of the auditory nerve and the person is required to work in a noisy environment. Hard of hearing persons with disease of the middle ear must be protected against infection of the upper respiratory tract and sinuses since recurrences of such infection may diminish their hearing further.

As with the deaf worker, the history of work or training is one of the most important considerations in determining the current capacities of the applicant who is hard of hearing. In this connection, persons with hearing losses may be found to have been successfully employed in practically every type of occupation. The United States Civil Service Commission has considered the hard of hearing (as well as the deaf) a very important segment of the labor market and has encouraged their employment. Of all types of positions found suitable for the physically impaired by survey, the largest number were those for the hard of hearing (2,179 of 5,100). The job performance of the hard of hearing—productivity (both quality and quantity) and efficiency—was found to compare favorably with that of the able bodied. Their experience of accidents was less favorable than that of the able bodied, owing to psychologic problems in individual cases."

59. Bluett, C. G.: Vocational Rehabilitation of Deaf and Hard of Hearing Ex-Serviceman, in Doherty, W. B., and Runes, D. D.: Rehabilitation of the War Injured, New York, Philosophical Library, Inc., 1943, pp. 548–566.

60(a) Best, H.: Deafness and the Deaf in the United States, New York, The Macmillan Company, 1943, pp. 217–218 and 327–338. (b) Garfield, J. R.: Employment Problems of the Hard of Hearing, Proceedings of the National Conference on Employment of the Disabled, Washington, D. C., Nov. 21–23, 1941.

61. Welles, H. H. III.: The Measurement of Certain Aspects of Personality Among Hard of Hearing Adults, Contributions to Education, no. 545, Teachers College, Columbia University, 1932.

62. Bjorlee, I.: The Deaf in Industry and Their Greatest Handicap, in Proceedings of the National Conference on Employment of the Disabled, Washington, D. C., Nov. 21–23, 1941.

63. Hearing Disabilities, Miscellaneous Bulletin 2519, Federal Security Agency, Vocational Rehabilitation Division, United States Office of Education, Washington, D. C., Government Printing Office, 1940.

Lindenov, Harald, "The Etiology of Deaf-Mutism," With Special Reference to Heredity, translated from the Danish by Axel Andersen, Copenhagen, Einar Munksgaard, Norregade 6, Copenhagen, K, 1945, Danish Cr. 25,00.00. 266 pages.

This study comprised an examination of 758 deaf-mutes

in Copenhagen and in the group of islands of Seeland, Lolland, and Falster, comprising the counties of Copenhagen, Raskilde, Frederiksborg, Holbaek, Soro, Paraesto, and Maribo. The aim of the writer was

1. To examine whether an objectively clinical clue can be found to the differential diagnosis between hereditary and non-hereditary deaf-mutism.
2. To examine whether, through an objective, clinical examination of the hearing children of the deaf-mute—possibly other relatives—some clue may be found that will disclose a taint or disposition to deaf-mutism.
3. To state the numeric proportion between persons with hereditary and those with non-hereditary deaf-mutism, and, in the various subsections of these 2 main groups, to indicate the sex-distribution and the importance of consanguinity.
4. To examine the importance of external influences to the occurrence of deaf-mutism.
5. To find the inheritance of the hereditary cases.
6. To examine whether any disposition to acquired deaf-mutism may be demonstrated and, if so, how it manifests itself.
7. To find out whether the various other disorders of possible hereditary determination that occur in association with deaf-mutism or in the families of the deaf-mutes have any relation to deaf-mutism and, if so, which relation.
8. To state the importance of the results arrived at, with a view to eugenics.

The author gives a brief summary of each chapter at the end of the publication which is as follows:

Summary
Introduction
Chapter I
Historical Survey

Chapter II

Definition of deaf-mutism. Review of *diagnosis* and differential diagnosis. Reference is made to a number of different attempts at finding a method of establishing the differential diagnosis between hereditary and non-hereditary deaf-mutism objectively.

Chapter III

Reference is made to previous investigations and theories on the *relation* of deaf-mutism to other disorders.

Chapter IV

Reference is made to a number of investigations and theories on the *hereditary transmission* of sporadic deaf-mutism, of which there is reason to point out W. Albrecht's investigations and theory on a monomeric recessive inheritance.

Deaf-mutism owing to heredolabyrinthic hardness of hearing, which is generally considered to be of dominant inheritance, was first described by W. Albrecht in 1923.

Atresia of the external auditory meatus which, when bilateral, may give rise to deaf-mutism, may be due to a hereditary developmental anomaly.

Chapter V

The *causes of acquired deaf-mutism* are grouped as follows: Constitutional disorders, traumata, acute and chronic infectious disorders and intoxications, and cases of suppurative otitis.

Endemic deaf-mutism, lues and otitis media are referred to in more detail.

Chapter VI

The comparative scanty investigations that have been made into the *pathologic anatomy* of hereditary deaf-mutism give the conclusion that sporadic deaf-mutism corresponds to Siebenmann's group 2a and the typus Scheibe, while heredolabyrinthic hardness of hearing or deafness corresponds to the typus Mondini.

WRITER'S EXAMINATION

Chapter VII

The examinations, all of which were made personally, comprise 32 families with deaf-mutes and a census examination of the deaf-mutes in the group of islands of Seeland, Lolland and Falster.

The list of the deaf-mutes that has been employed comprises 678 persons, of whom 480 or about 71% have been examined. The persons examined were considered a non-selected material.

On correction the total number of diagnosed cases of deaf-mutism in the districts in question which came to the knowledge of the writer is found to be 758, which presumably is very near the actual figure. The corresponding official census figure is 727.

Moreover the aim of the examinations, the origin of the case record material, the technique employed, and the nomenclature are accounted for.

Family Examinations

Chapter VIII

Extracts are given of the *case records* of the examined members of 32 families with deaf-mutes, arranged according to families. Cases of heredolabyrinthic deaf-mutism did not appear in the material of family examinations.

Chapter IX

The number of function-tested *deaf-mutes* is 58, 8 of them being hereditary, 36 acquired and 14 unclassifiable cases.

No appreciable deviation from the normal in the general habitus, including height and weight, was found in any of the above-mentioned groups of deaf-mutes:

Accumulatio ceruminis, wide or narrow external auditory meatuses, dull tympanic membranes, and existing or previous otitis media supp. occurred in all groups.

Remnants of hearing were found in a total of 50%, with a fairly even distribution in the different groups.

Nothing whatever was found in support of Langenbeck's law of symmetry.

A diminished vestibular irritability in one or both sides occurred in all groups in 7 cases altogether, or in 12.1%. Absence of the vestibular function for caloric reaction in one or both sides occurred in 14 cases, or 24.1%, 13 being acquired and 1 an unclassifiable case, but none of them hereditary.

A swinging or swaying gait occurred in 14 cases, or 24.1%, 11 being acquired and 3 unclassifiable cases, but none of them hereditary cases. In the remaining material this disturbance of gait was

present in all cases of sporadic deaf-mutism associated with retinitis pigmentosa, but not in other cases of hereditary deaf-mutism.

Menieriform symptoms occurred in 14 cases, or 24.1%, with a fairly even distribution in the different groups.

Strabismus, anisocoria, hypermetropia, myopia, astigmatism, diminished visual acuity, and tortuous vessels in the fundus of the eye were found to occur in all groups.

Left-handedness was found in a single case, one of probably sporadic deaf-mutism.

Altogether no clinical symptom was found that can be used as a means of differential diagnostic between hereditary and acquired deaf-mutism.

Chapter X

The 32 families with deaf-mutes comprise 69 *hearing members*, 58 having been examined.

In the general habitus, including height and weight, on examination of the function of hearing and the vestibular irritability or otherwise, no clinical symptom was found that could reveal a trait for sporadic deaf-mutism, or on the whole distinguish hearing members of families with deaf-mutes from other hearing persons.

Census Examinations

Chapter XI

Extracts are given of the remaining *case records* comprised by the census examination.

Chapter XII

The 480 deaf-mute subjects are classified as follows: 103 with sporadic, 45 with probably sporadic, 72 with possibly sporadic, 6 with heredolabyrinthic, 3 with probably heredolabyrinthic, 188 with acquired, and 63 with possibly acquired deaf-mutism. The causes within the two latter groups are specified.

The sex distribution does not differ essentially from the normal.

The frequency of the hereditary deaf-mutism in proportion to the total number is computed to be 45.5% or about half the number.

Chapter XIII

Consanguinity of parents was found in 10 out of 103 cases of sporadic deaf-mutism, or 9.7%, in 5 out of 45 cases of probably sporadic deaf-mutism, or 11.1%, in 3 out of 6 cases of heredolabyrinthic deaf-mutism (or 50%), in 4 out of 185 cases of acquired deaf-mutism, or 2.2%, in 5 out of 70 cases of possibly sporadic deaf-mutism, or 7.1%, and in 3 out of 62 cases of possibly acquired deaf-mutism, or 4.8%.

The percentages arrived at show the significance of consanguinity to the appearance of hereditary deaf-mutism.

The total number of deaf-mutes resulting from consanguineous marriages amounts to 6.3%, while the frequency of consanguineous marriages in the ordinary population is given as 2.1%.

Chapter XIV

Bottle-feeding predisposes to disorders that may produce deaf-mutism, especially rachitis and otitis media supp.

Apart from this no signs were found indicating that nutrition and hygiene at home, alcoholism or tuberculosis in the parents should generally be of any significance to the occurrence of deaf-mutism.

Chapter XV

The *hereditary transmission* of the sporadic deaf-mutism was found to be a monomeric, recessive transmission. In the case of the few, apparent exceptions herefrom it has been possible to give probable explanations.

It has not been possible by means of the present material to determine the inheritance of the heredolabyrinthic deaf-mutism.

Chapter XVI

It is demonstrated that probably there is a *predisposition* to acquired deaf-mutism.

It has not been possible to decide whether it is due to a hereditary trait for sporadic deaf-mutism predisposing to acquired deaf-mutism, or to a special predisposition to acquired deaf-mutism or to both.

This predisposition occurs in an especially perspicuous form in the pedigrees 10, 35, and 108.

Chapter XVII

The possibility of a unilateral manifestation of the gene for the sporadic deaf-mutism, present in a single case in pedigree No. 65, is intimated. Apart from this, no connection between *endogenous hardness of hearing* and deaf-mutism was found.

In the 4 pedigrees: 35, 109, 135, and 138 conditions were found indicating that a predisposition to acquired deaf-mutism may occasionally manifest itself through the occurrence of exogenous hardness of hearing and occasionally through a generally decreased resistance to disease. Apart from this no connection between *exogenous hardness of hearing* and deaf-mutism was found.

Chapter XVIII

Retinitis pigmentosa was found in 28 cases, or 58.3% the frequency in the population being indicated as 0.05%. Thus, there no doubt is a correlation between retinitis pigmentosa and sporadic deaf-mutism. That it should be due to coupling must be considered improbable. It is presumably due to a special, heterophenous gene.

It is possible that this gene also comprises feeble-mindedness, which is represented by 4 cases in the pedigrees in question.

Cases of *hereditary ataxia* did not occur in the present material.

Any correlation between deaf-mutism and feeble-mindedness, except in connection with retinitis pigmentosa, or any correlation to *other disorders* was not found.

Eugenics

Chapter XIX

Indications for abortus provocatus, sterilization, and dissuasion from marriage will presumably in most essential respects comprise the same combinations and may be present in the following cases, the prognosis of heredity being stated in parenthesis:

Between two persons with sporadic deaf-mutism (100%).

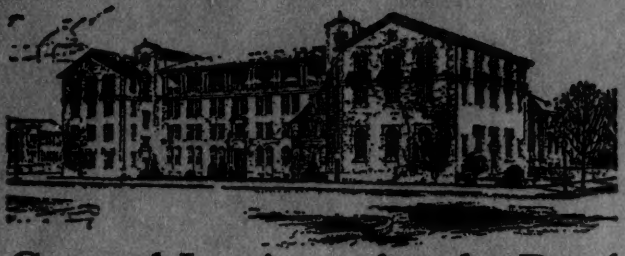
Between a person with sporadic deaf-mutism and one who is a carrier of a trait for sporadic deaf-mutism (50%).

Between two persons who are carriers of a trait for sporadic deaf-mutism (25%).

Between two persons with heredolabyrinthic deaf-mutism (75 (or 100)%).

Between a person with heredolabyrinthic deaf-mutism and one without this disorder (50(or 100)%).

A few reservations with respect to the said indications are made.



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